



Wind energy research and the industry

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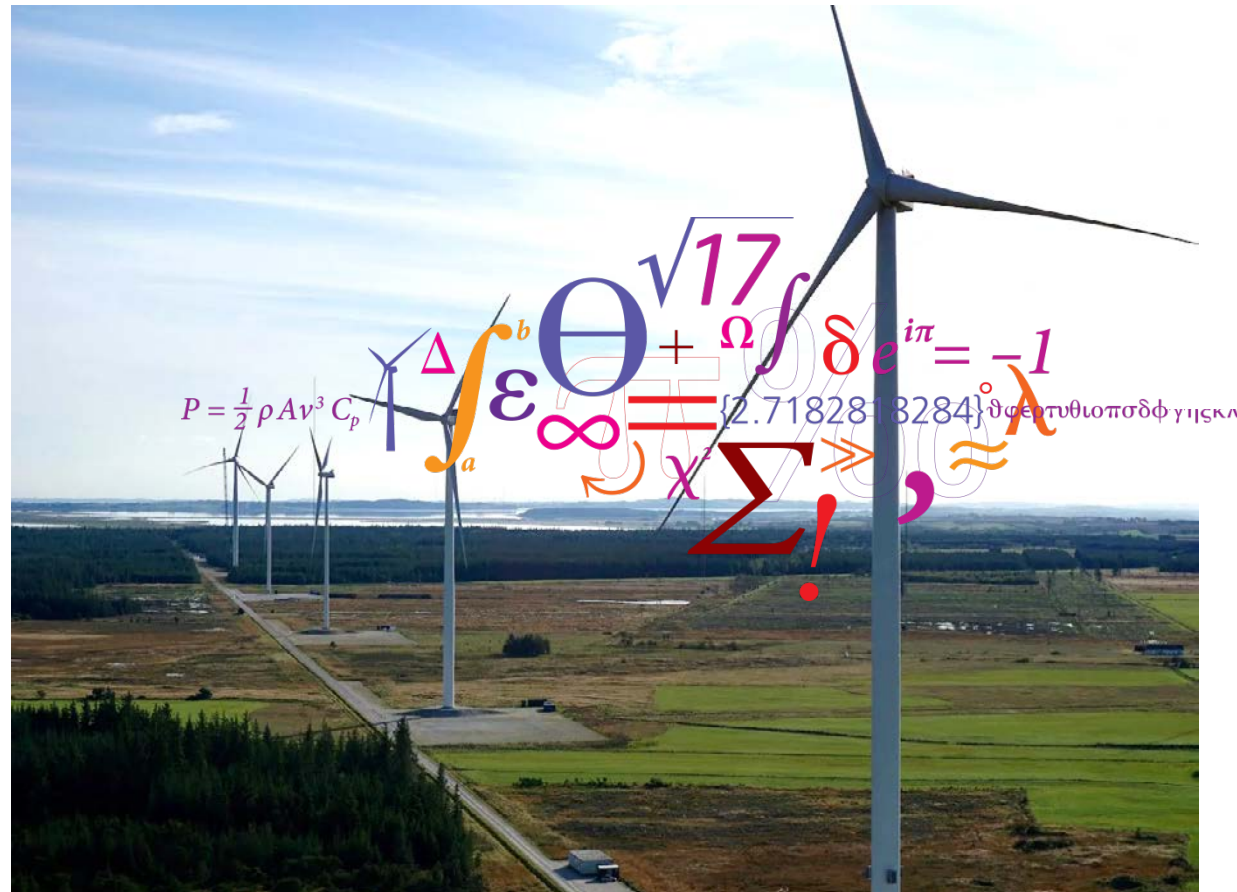
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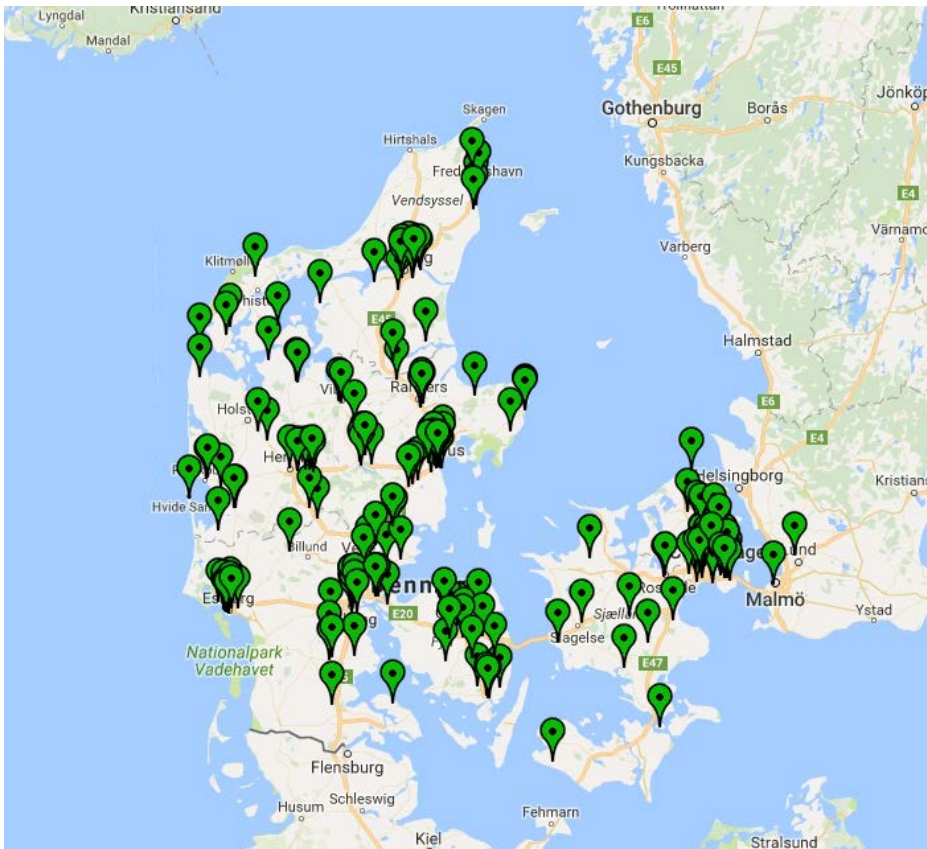
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What is the importance to the wind industry of having a strong Danish base?

What is the importance to Denmark of having a strong wind industry?

The Wind Industry in Denmark



3M A/S Aalborg Aalborg Gummivarefabrik A/S A2SEA A/S Aalborg Port A/S Aalborg Universitet Aarhus Port ABB A/S
 AB-Inventech A/S Advokat aktieselskab Borch AH Industries A/S Aibel Denmark A/S Alfa Laval Nordic Alwind AMU vest APS Apro
 Wind aps Andersen Partners Advokatpartnerselskab AREFA Denmark A/S Atradius BACH Composite Industry Bachmann
 electronic GmbH Balsev Rådgivende Ingeniører A/S BIC Electric Bech-Bruun bech Rechtsanwalte Beckhoff Automation A/S Beredskabscenter
 Aalborg Udanrettescenter Best Energy A/S Betech A/S BIRF A/S Bjerregaard Consulting A/S Blade Repair Solutions Blade Test Centre A/S Bladena
 Bladt Industries Blue Company A/S Blue Water Shipping A/S BMS Krangården Boskik A/S B&B
 Industriaufarbeitungsring A/S Brd. Klee A/S Bruel & Kjaer Sound & Vibration Measurement A/S Bruun & Højle Bureau Ventas C.C. Jensen A/S
 Certex Denmark A/S Connected Wind Services Denmark A/S Coles A/S Copenhagen Infrastructure Partners
 COWI DAFA A/S Damatch Danfoss A/S Dansk Gummi Industri A/S Dansk Metal DEIF A/S
 DELACOUR DELPYRO A/S DELTA DESITEK A/S Deugro Denmark A/S DR-II (DTS institut)
 Dialight BTI A/S DHL Global Forwarding A/S Duma Industri A/S DNV GL
 Group Dokka Fasteners A/S DONG Energy DSV DTU
 VindenergiEast Metal Trade A/S Enea A/S EKI Aps ELS Group A/S Elitronic A/S
 EMD International A/S Energy Project Shipping Aps Envision Energy E:ON EP Tools A/S Esbjerg Port
 ESP Consulting Nordic EUC Vest / KursusCenter Vest European Energy Eurowind Energy A/S EXACT RECRUITMENT
 GROUP F. C. Row Planning Falck Safety Services A/S Fiberline Composites A/S Fibox A/S Fjerto A/S Force Technology
 Foga Aps Fritz Schur Energy Fritz Schur Technical Group A/S FT Technologies Aps Fyns Kran Udstyr A/S GARDIT A/S
 Geo GK Energi Aps Global Lighting Protection Services GML Search & Selection A/S Grønlly A/S Grenaa Havn A/S Haco A/S Hans
 Buch A/S HARTING Aps Hempel A/S HOFOR Horsens Energicenter Nord Aps Horten Advokatpartnerselskab IHR
 IMPACT HSM Industri A/S HSWind Hvide Sande Port HYDAC A/S Hydratex A/S Hydra Grene A/S Hydratech Industries
 Wind Power A/S Hyperbanc Consult A/S IED Greenpower Ibm electronic a/s The Innovation Office Aps International Wind Academy Lolland A/S
 Ingeniørhøjskolen Aarhus Universitet Insero Horsens ISC Rådgivende Ingeniører A/S IPS-Group A/S ITW Densit JSB Plast Jupiter
 Group A/S Just Wind DK Aps Autronica Fire and Safety A/S Keel Solution KK Wind Solutions Kaaen Heun Shipping EFTF Aps
 Klingspor A/S Klüber Lubrication Skandinavien A/S Lemvig-Müller A/S Liftra Aps Lind Jensens Maskinfabrik
 A/S Lindø Industripark A/S LM Wind Power Group Local Energy A/S L-tek A/S Kromann
 Reumert Maersk Training MAKE Megatrade Beslag A/S Metalock Denmark A/S Miracle G-Inspect A/S Mita-Teknik A/S
 MHI Vestas M4.0&Co Offshore Wind A/S MT Højgaard A/S N.C. Nielsen sss Nellemann Survey
 NEAS Energy A/S Nibe Wind Components Niebuhr Gears A/S Niras Nissens A/S Nordex
 Energy GmbH Nordic Offshore Marine Nord-lock Aps Nordmark Maskinfabrik A/S Novatec Aps Novenco A/S Ocean Team Windcare A/S
 Oer Energy Oglænd System A/S Optica A/S Orbicon A/S Orbital A/S Orga Aviation BV Parker Hannifin Denmark A/S Per
 Aarsleff A/S PHOENIX CONTACT A/S PlanEnergi PP Teknik Aps Primo Denmark Prodan A/S Quantec Signals GmbH Ramboll
 Danmark A/S Reichhold Danmark A/S Resc. Revisionsfirmaet Ole Vestergaard A/S Roenne Havn A/S Romo Wind A/S Ross DK
 A/S Resolux Aps Roctec Denmark Aps RT9 Abrasives A/S Salling Plast A/S Sauer Robkrow Law Firm Scania Minds Scancon A/S Scanel
 International A/S Scandiox Scandiox Denmark A/S Schaeffler Danmark Aps Schneider Electric A/S Danmark
 Seaproof Solutions SEGES P/S Semco Maritime Siemens A/S Sika A/S Siemens Wind Power
 A/S Skagen Sandblæseri & Skibs-Service Afd. Syd Aps Skovgaard Invest Aps Solar Denmark A/S SSP
 Technology A/S Stego Norden A/S Svendborg Brakes A/S Svecco Swire Blue Ocean A/S Terna The Switch nien
 Elephants A/S Thomas A/S Thyborøn Port Tibnor A/S Torben Rafn & Co. A/S Træborg Sealing Solutions Denmark A/S UN-FLY A/S
 Universal Foundation A/S University of Southern Denmark Valmont SM Vattenfall A/S vb Enterprise A/S
 Ventherm A/S Vento Energy Support Aps Vestas Wind Systems A/S VikarDanmark Visk Plast A/S Wissenborn
 A/S Welcon A/S WILLBRANDT Gummiteknik Aps Wind1 A/S Wind Energy Denmark Wind Estate A/S wpt offshore
 Denmark A/S Ymer Technology Zenith Advisory Zero-Max A/S Zelt-Beleg ZITON

CLOSE TO
250 MEMBERS

Good framework conditions for the sector

Well-established sector

- Costs
- Operation
- Integration

Focus on

- Industrialization
- Reliability
- Quality and validation
- Optimization
- Innovation

Need for

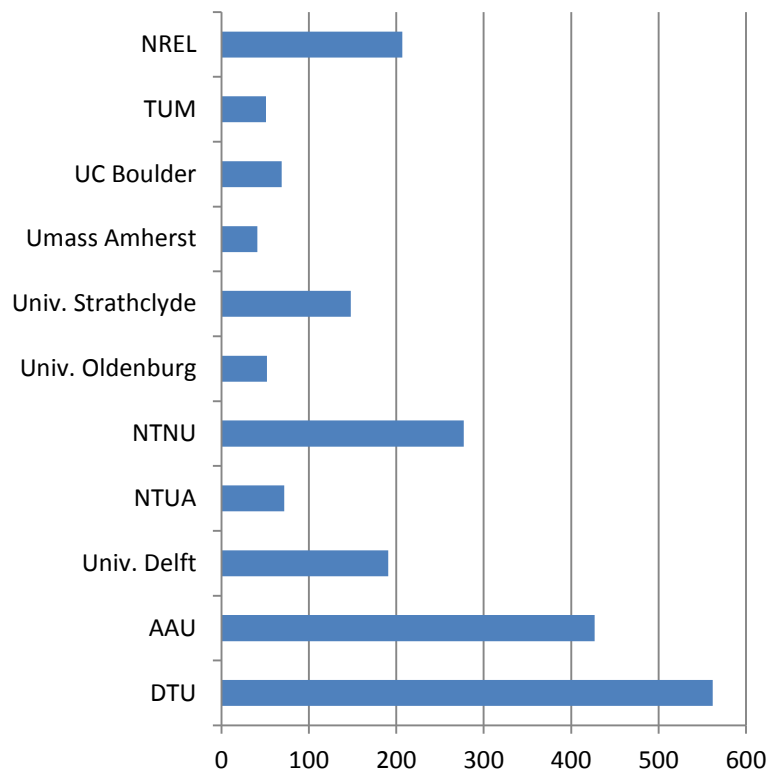
- Access to state-of-the-art knowledge
- Test and demonstration facilities
- Qualified staff
- Market for demonstration

University role

- Research (knowledge generation)
 - Education and training
 - Contribution to innovation
 - Tests and consultancies

Research and test facilities

Public. 2010-15



Web of Science 21-10-2016, topic: "wind energy" OR "wind power" OR wind turbine" OR "wind farm"

- Full-scale testing facilities (Østerild and Høvsøre)
- Blade tests (Blaest)
- LORC
 - Nacelle tests
 - Support structures
 - Climate chambers
- Windscanner
- Research turbines
- National Wind Tunnel
- Large scale structural test facility (Villum foundation)
- Lab facilities
-

National Research Budgets

Nation	2015 Budget in mio EUR	Jobs X 1000
Denmark	14.3	31
Germany	91.1	150
Spain	86.4	20
Japan	117.2	4
USA	98.3	88
European Commission	91.9 (research) 197.6 (demonstr.)	330

Source: IEA Wind TCP, 2015 Annual Report

Concluding remarks

- Together strengthen the strategic priority of public wind energy research in Denmark
- New models for industry-university cooperation
- Increased coordination of the Danish research, test and education efforts through MEGAVIND
- Plan the Danish effort in an European and global context

